

LM101A-LM201A
LM301A

SINGLE OPERATIONAL AMPLIFIERS

	LM101A LM201A	LM301A
■ INPUT OFFSET VOLTAGE	0.7mV	2mV
■ INPUT BIAS CURRENT	25nA	70nA
■ INPUT OFFSET CURRENT	1.5nA	2nA
■ SLEW RATE AS INVERTING AMPLIFIER	10V/μs	10V/μs

DESCRIPTION

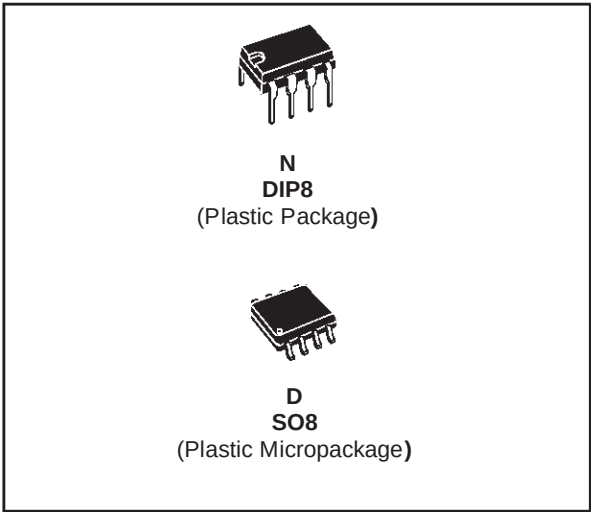
The LM101A is a general purpose operational amplifier which offers many features: supply voltages from ±5V to ±22V, low current drain, overload protection on the input and output, no latch-up when the common-mode range is exceeded, free from oscillations and compensation with a single 30pF capacitor. It has advantages over internally compensated amplifiers in that the compensation can be tailored to the particular application: slew rate of 10V/μs and bandwidth of 3.5MHz can be easily achieved.

ORDER CODE

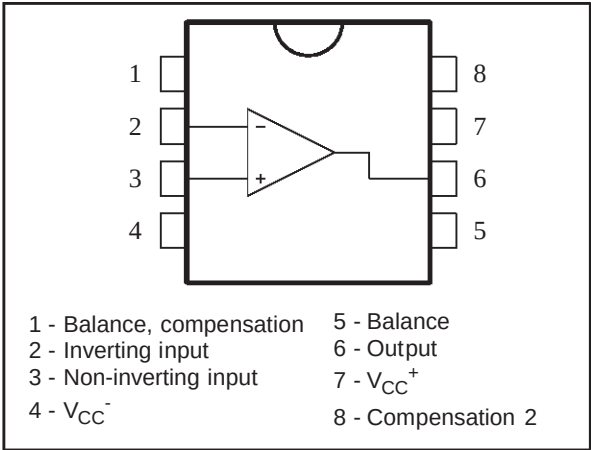
Part Number	Temperature Range	Package	
		N	D
LM101A	-55°C, +125°C	•	•
LM201A	-40°C, +105°C	•	•
LM301A	0°C, +70°C	•	•

Example : LM201AN

N = Dual in Line Package (DIP)
D = Small Outline Package (SO) - also available in Tape & Reel (DT)

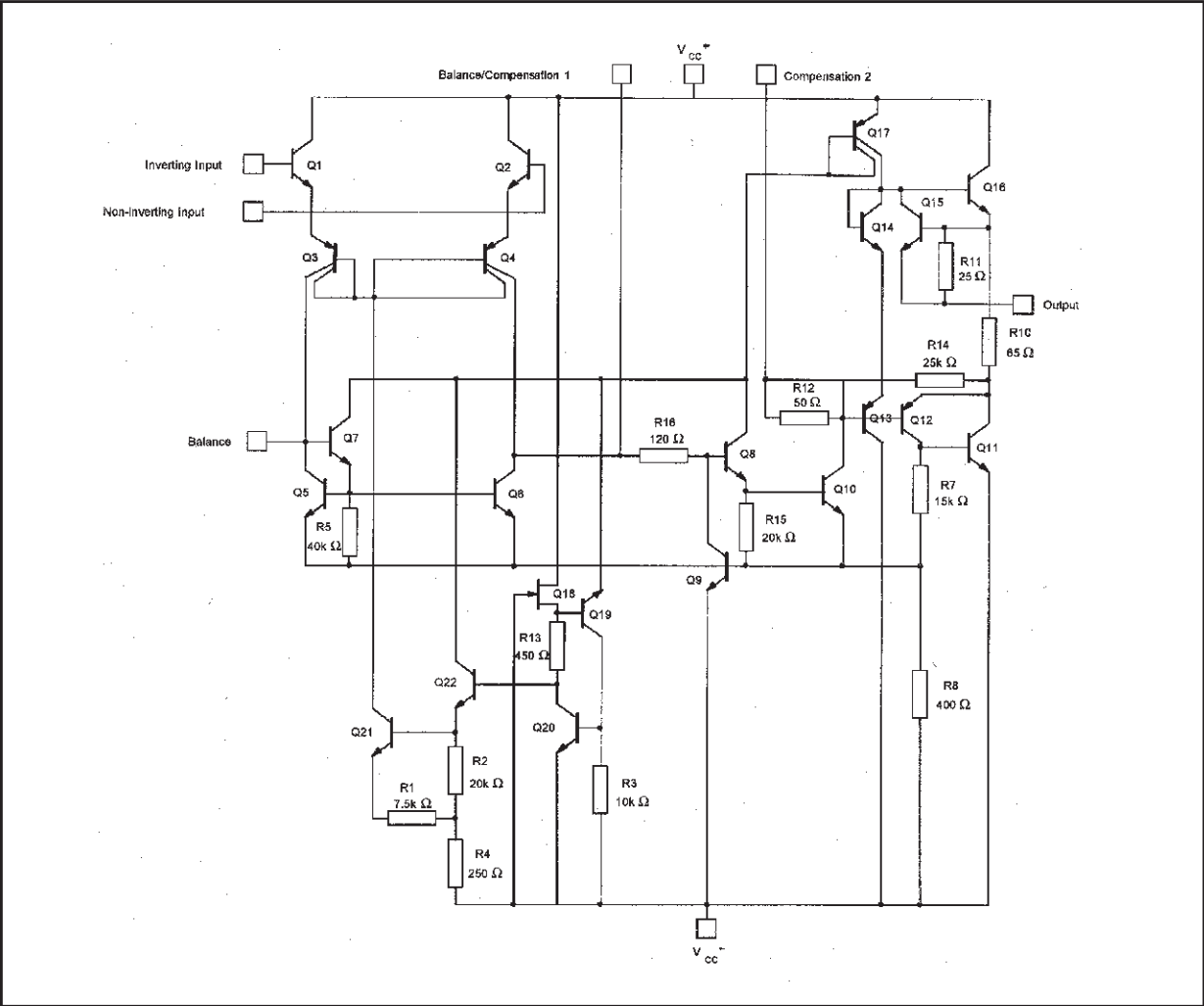


PIN CONNECTIONS (top view)



LM101A - LM201A - LM301A

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	LM101A	LM201A	LM301A	Unit
V _{CC}	Supply voltage	±22			V
V _i	Input Voltage	±15			V
V _{id}	Differential Input Voltage	±30			V
P _{tot}	Power Dissipation N Suffix D Suffix	500 300			mW
	Output Short-circuit Duration	Infinite			
T _{oper}	Opearting Free-air Temperature Range	-55 to +125	-40 to +105	0 to +70	°C
T _{stg}	Storage Temperature Range	-65 to +150			°C

ELECTRICAL CHARACTERISTICS $\pm 5V \leq V_{CC} \leq \pm 20V$, $C_1 = 30pF$, $T_{amb} = 25^\circ C$ (unless otherwise specified)

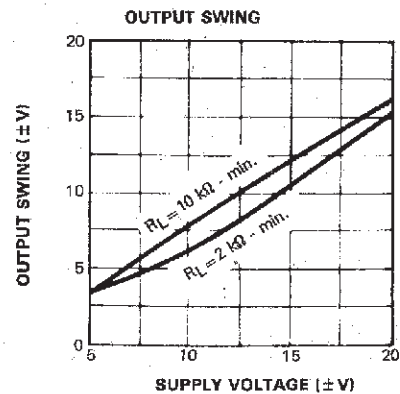
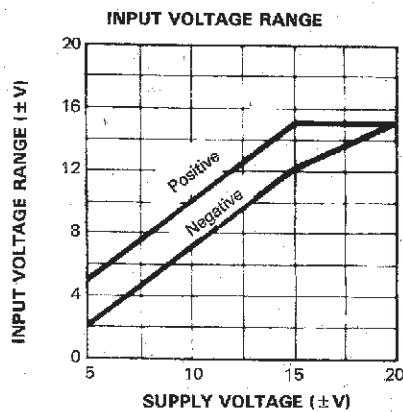
Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage ($R_S \leq 10k\Omega$) $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$		0.7	2 3		2	7.5 10	mV
DV_{io}	Input Offset Voltage Drift $T_{min} \leq T_{amb} \leq T_{max}$		3	15		6	30	$\mu V/^\circ C$
I_{ib}	Input Bias Current - note $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$		25	75 100		70	250 300	nA
I_{io}	Input Offset Current $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$		1.5	10 20		2	50 70	nA
DI_{io}	Input Offset Current Drift $T_{min} \leq T_{amb} \leq 25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$		10 20	100 200		10 20	300 600	$pA/^\circ C$
A_{vd}	Large Signal Voltage Gain * $V_O \leq 10V$, $R_L = 2k\Omega$ $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$	50 25	100		25 15	100		V/mV
SVR	Supply Voltage Rejection Ratio ($R_S \leq 10k\Omega$) $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$	80 80	96		70 70	96		dB
I_{CC}	Supply Current, no load $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$		1.8	3 3		1.8	3 3	mA
V_{icm}	Input Common Mode Voltage Range ($V_{CC} = \pm 20V$) $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$	± 15 ± 15			± 15 ± 15			V
CMR	Common Mode Rejection Ratio ($R_S \leq 10k\Omega$) $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$	80 80	96		70 70	96		dB
I_{OS}	Output Short-circuit Current * $T_{amb} = +25^\circ C$	10	30	50	10	30	50	mA
$\pm V_{OPP}$	Output Voltage Swing * $T_{amb} = +25^\circ C$ $T_{min} \leq T_{amb} \leq T_{max}$ $R_L = 10k\Omega$ $R_L = 2k\Omega$ $R_L = 10k\Omega$ $R_L = 2k\Omega$	12 10 12 10	14 13		12 10 12 10	14 13		V
SR	Slew Rate ($V_i = \pm 10V$, $R_L = 2k\Omega$, $C_L = 100pF$, unity gain) - ¹⁾	0.25	0.5		0.25	0.5		V/ μs

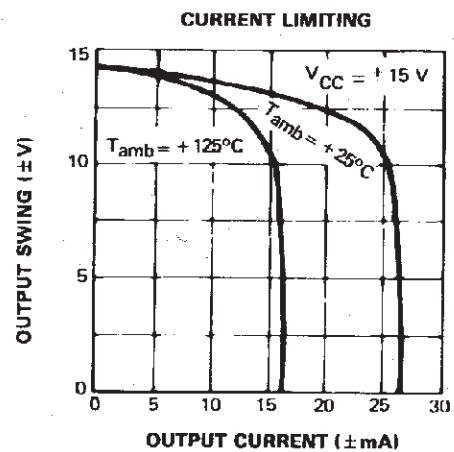
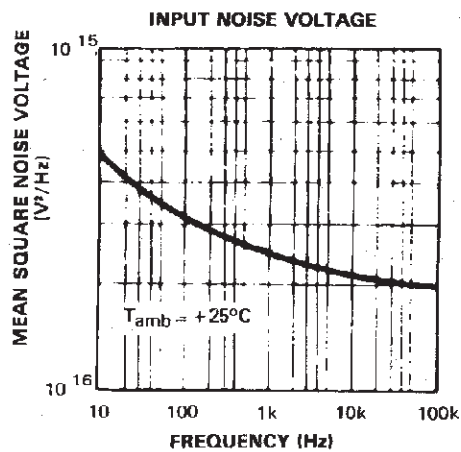
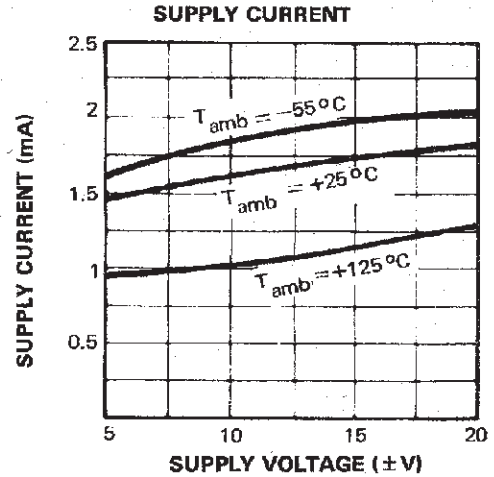
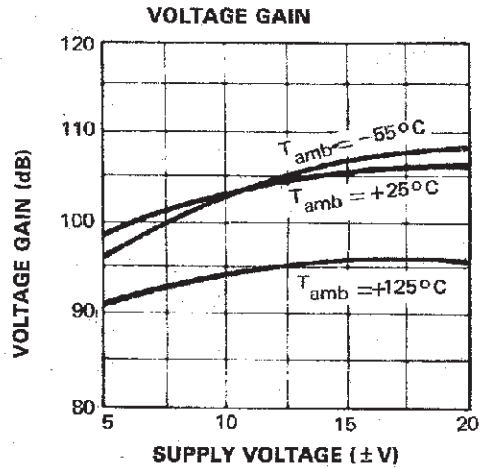
LM101A - LM201A - LM301A

Symbol	Parameter	LM101A - LM201A			LM301A			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
t_r	Rise ($V_i = \pm 20\text{mV}$, $R_L = 2\text{k}\Omega$, $C_L = 100\text{pF}$, unity gain)		0.3			0.3		μs
K_{OV}	Overshoot ($V_i = 20\text{mV}$, $R_L = 2\text{k}\Omega$, $C_L = 100\text{pF}$, unity gain)		5			5		%
Z_i	Input Impedance *	1.5	4		1.5	4		$\text{M}\Omega$
GBP	Gain Bandwidth Product * ($V_i = 10\text{mV}$, $R_L = 2\text{k}\Omega$, $C_L = 100\text{pF}$, $f = 100\text{kHz}$)	0.5	1		0.5	1		MHz
THD	Total Harmonic Distortion ($f = 1\text{kHz}$, $A_v = 20\text{dB}$, $R_L = 2\text{k}\Omega$, $V_o = 2V_{pp}$, $C_L = 100\text{pF}$)		0.015			0.015		%
e_n	Equivalent Input Noise Voltage $f = 1\text{kHz}$, $R_s = 100\Omega$		25			25		$\frac{\text{nV}}{\sqrt{\text{Hz}}}$

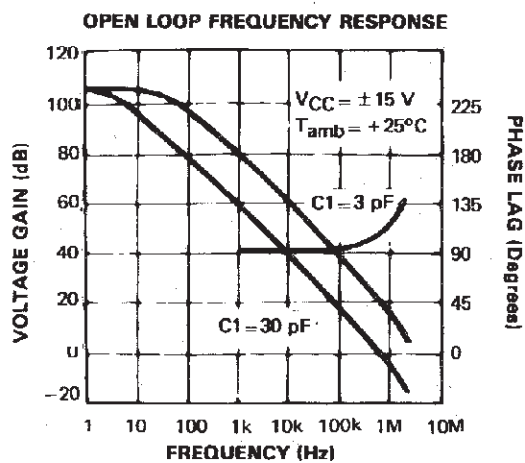
1. May be improved up to $10\text{V}/\mu\text{s}$ in inverting amplifier configuration

* $\Rightarrow V_{CC} = \pm 15\text{V}$, $T_{amb} = +25^\circ\text{C}$ (unless otherwise specified)

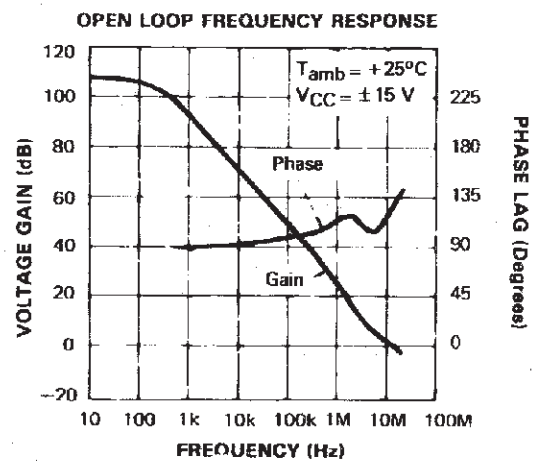




SINGLE POLE COMPENSATION



FEED FORWARD COMPENSATION

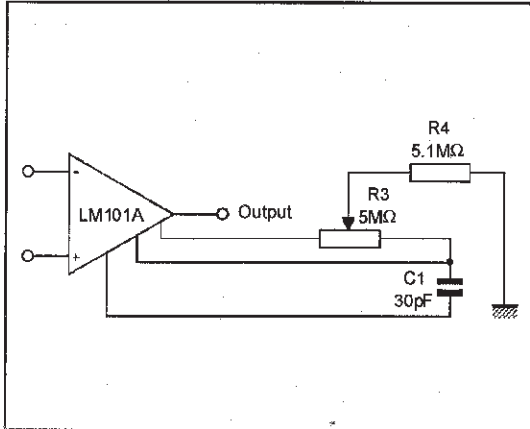


SINGLE POLE COMPENSATION

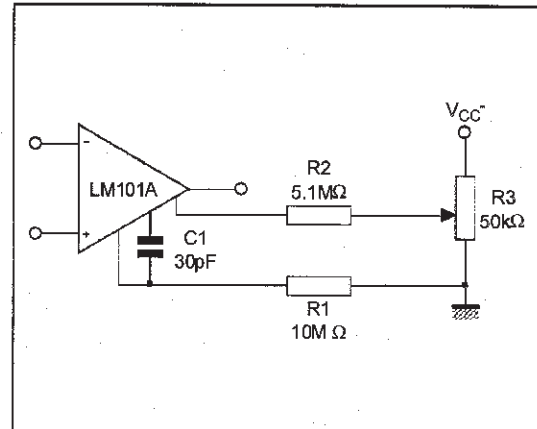
FEED FORWARD COMPENSATION

BASIC DIAGRAM

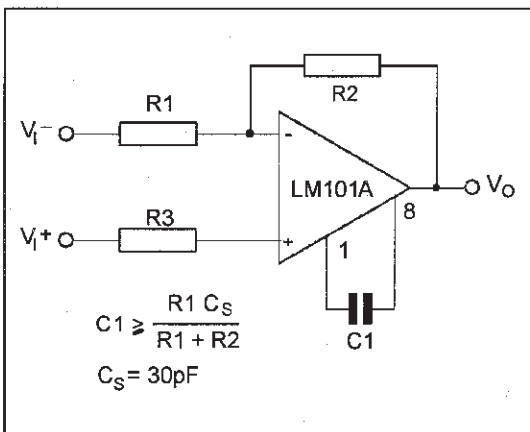
BALANCING CIRCUIT



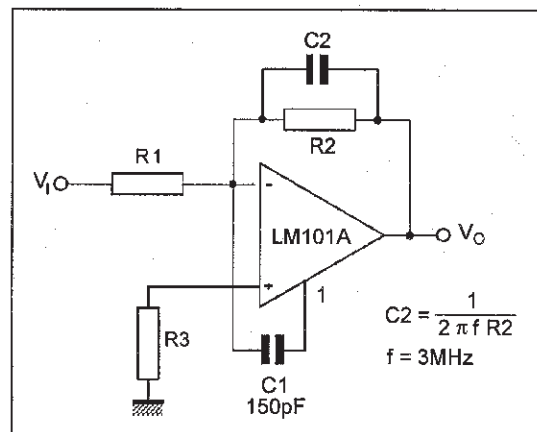
ALTERNATE BALANCING CIRCUIT



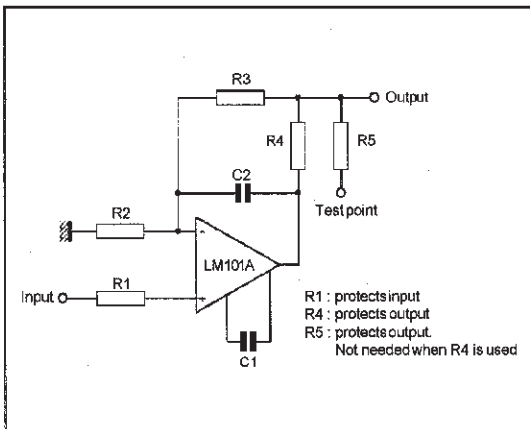
SINGLE POLE COMPENSATION



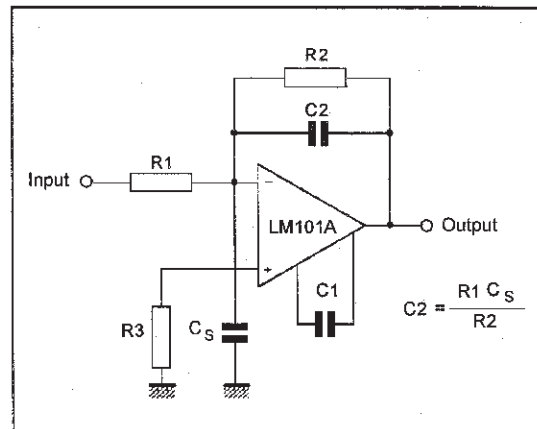
FEEDFORWARD COMPENSATION



PROTECTING AGAINST GROSS FAULT CONDITIONS

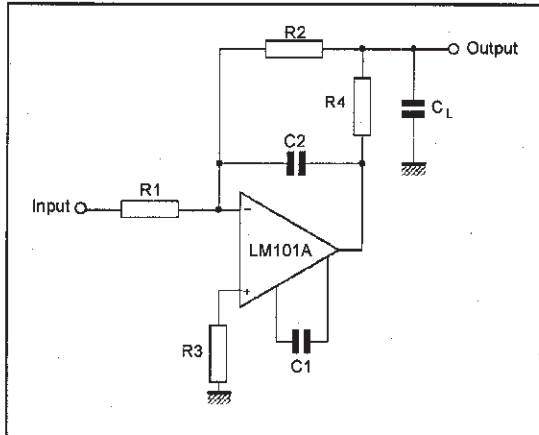


COMPENSATING FOR STRAY INPUT CAPACITANCES OR LARGE FEEDBACK RESISTOR



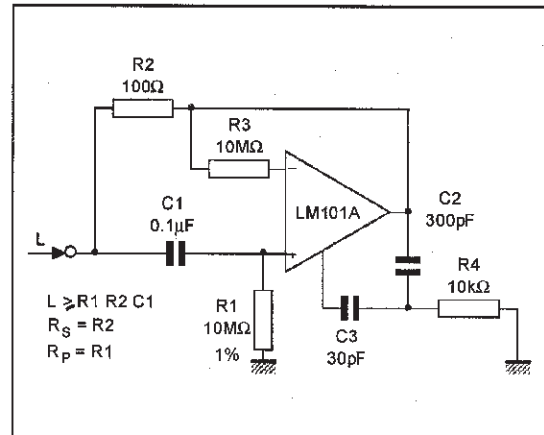
BASIC DIAGRAM (continued)

ISOLATING LARGE CAPACITIVE LOAD

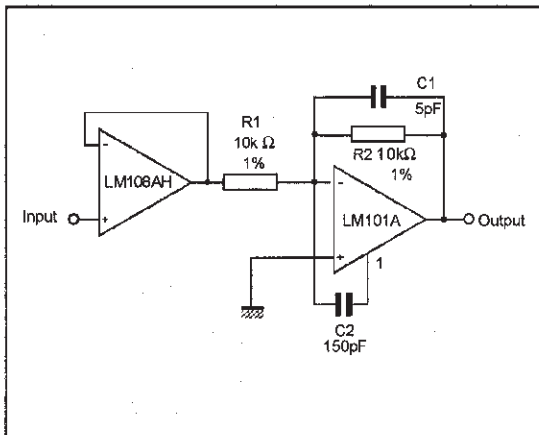


TYPICAL APPLICATIONS

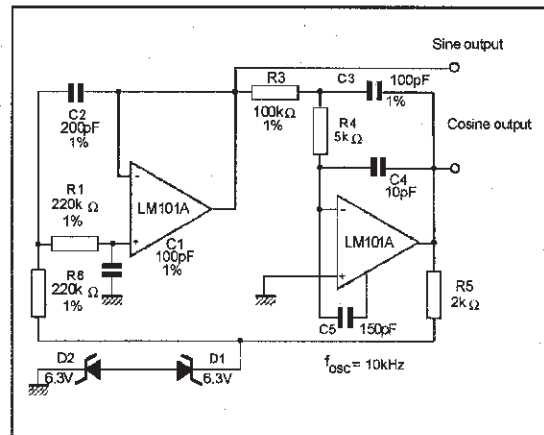
SIMULATED INDUCTOR



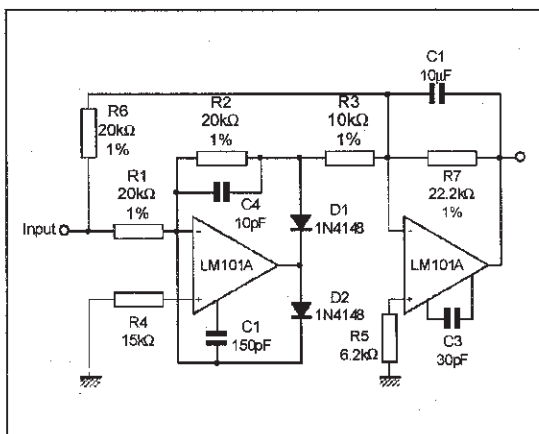
FAST AMPLIFIER WITH HIGH INPUT IMPEDANCE



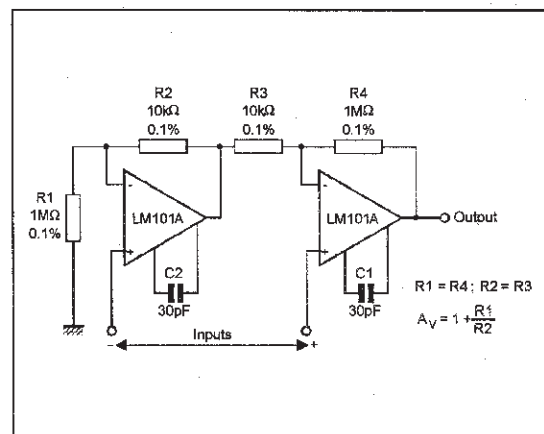
SINE WAVE OSCILLATOR



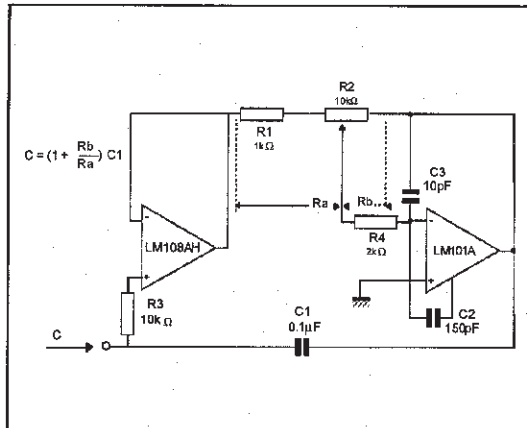
FAST AC/DC CONVERTER



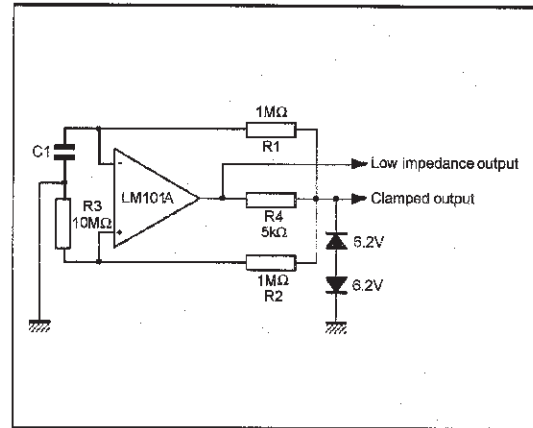
INSTRUMENTATION AMPLIFIER



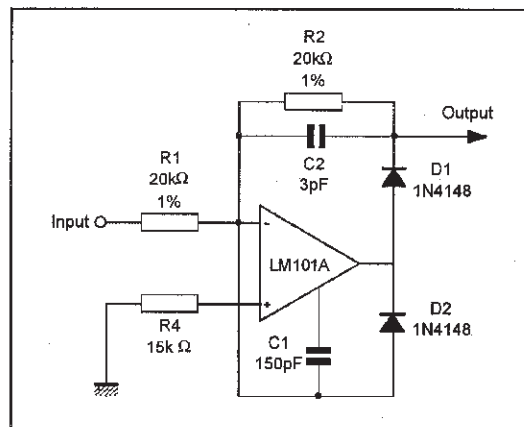
TYPICAL APPLICATIONS (continued)
VARIABLE CAPACITANCE MULTIPLIER



LOW FREQUENCY SQUARE WAVE GENERATOR



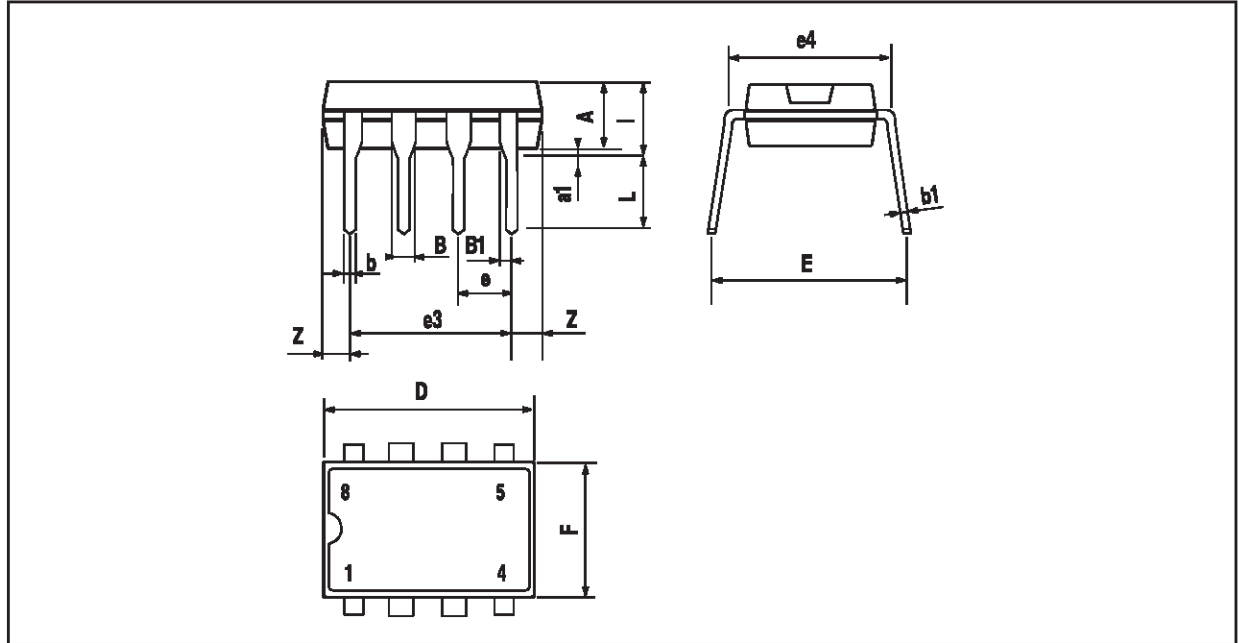
FAST HALF WAVE RECTIFIER



LM101A - LM201A - LM301A

PACKAGE MECHANICAL DATA

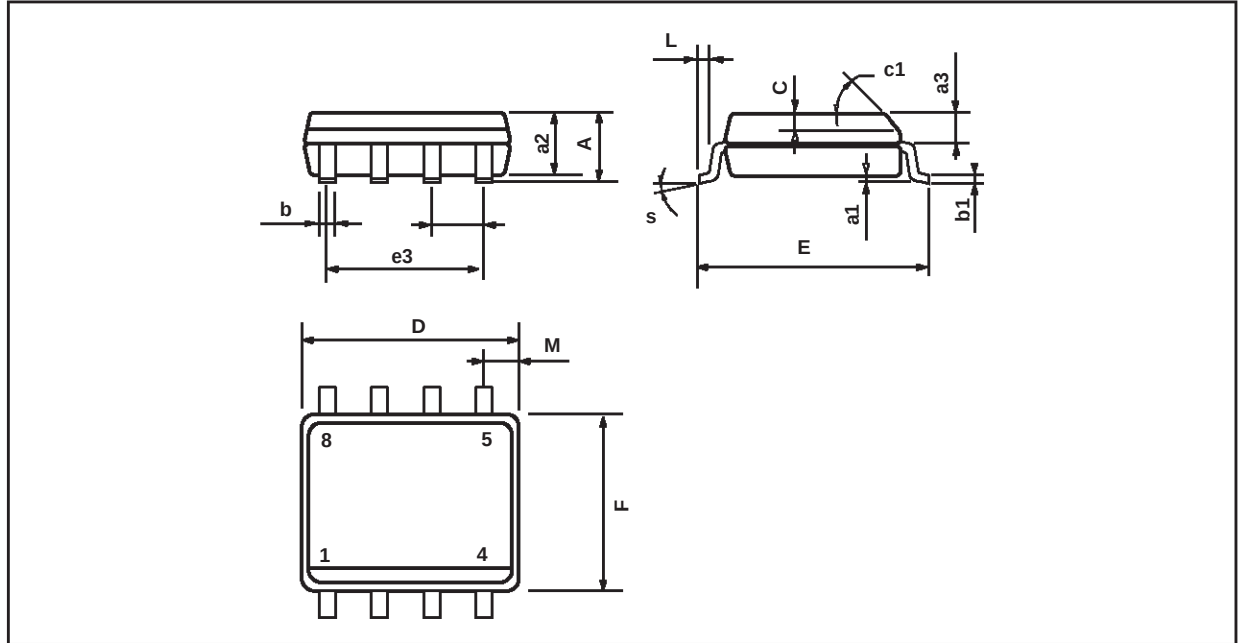
8 PINS - PLASTIC DIP



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

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